Amendments to the Drawings:

The attached sheet of drawings includes changes to Figure 1. This sheet, which includes Figure 1 only, replaces the original sheet including Figure 1. In Figure 1 a second detector 14' has ben added.

Attachment: Replacement Sheet.

R E M A R K S

Claims 1-3, 5-7, 9-19, 25, and 29 are canceled. Claim 4 is withdrawn from consideration. Claims 8, 20-24, 26-28, and 30-40 are pending. Re-examination and reconsideration are requested.

In the office action, dated September 14, 2005, the examiner objected to the drawings under 37 CFR 1.83(a) as failing to show every feature specified in the claims. The examiner rejected claims 20-24, 26-28 and 30-40 under 35 U.S.C. §112, first and second paragraphs for the reasons specified in sections 4 and 5 of the office action. The examiner rejected claims 1, 2, 7, and 8 under 35 U.S.C. §102(b) as being anticipated by any one of Harding *et al*, "Photon-induced Positron Annihilation Radiation (PIPAR) - A Novel Gamma-ray Imaging Technique for Radiographically Dense Materials," Nuclear Instruments and Methods in Physics Research, A 398, pp. 409-422 (1997), (Harding); Gilboy *et al*, "On the Potential of Photon Induced Annihilation Photons for Inspection of Engineering Structures," Appl Radiat. Isot., Vol. 48, No. 10-12, pp. 1625-1633 (1997) (Gilboy), or Travora *et al*, "One-Sided Imaging of Large, Dense Objects Using 511-keV Photons from Induced-Pair Production," IEEE Transactions on Nuclear Science, Vol. 45, No. 3, pp. 401-406 (1998), (Travora). The examiner rejected claim 3 under Section 102(b) as being anticipated by Harding, and rejected claim 5 as being anticipated by Travora.

Applicant believes that none of the currently-pending claims are obvious over the cited references and respectfully traverses the examiner's rejections for the reasons that will be set forth below.

Argument:

Re the Objections to the Drawings:

The examiner objected to the drawings as failing to show the second detector of claim 22. In response, applicant has amended drawing Figure 1 to illustrate a second detector 14'. Paragraph

40 of the specification is amended to refer to the second detector 14'. The drawings should be in compliance with 37 CFR 1.83(a).

Legal Standard For Rejecting Claims Under 35 U.S.C. §112, First Paragraph

The legal standard for determining whether the disclosure provides a sufficient description of the invention is whether a person reasonably skilled in the art could make or use the invention without undue experimentation based on the disclosure and on information known in the art. United States v. Telectronics, Inc., 857 F.2d 778, 8 USPQ2d 1217 (Fed. Cir. 1988). The fact that experimentation may be complex does not necessarily make it undue if the art typically engages in such experimentation. In re Wands, 858 F.2d 731, 8 USPQ2d 1400 (Fed. Cir. 1988). That is, the test of enablement is not whether any experimentation is required, but whether, if experimentation is necessary, it is undue. In re Angstadt, 537 F.2d 498, 190 USPQ 214 (CCPA 1976).

The factors to be considered when determining whether there is sufficient evidence to support a determination that a disclosure does not satisfy the enablement requirement and whether any necessary experimentation is "undue" are listed in MPEP 2164.01(a) and include, but are not limited to:

(A) The breadth of the claims;

(B) The nature of the invention;

(C) The state of the prior art;

(D) The level of one of ordinary skill;

(E) The level of predictability in the art;

(F) The amount of direction provided by the inventor;

(G) The existence of working examples; and

(H) The quantity of experimentation needed to make or use the invention based on the content of the disclosure.

It is improper to conclude that a disclosure is not enabling based on an analysis of only one of the above factors while ignoring one or more of the others. MPEP 2164.01(a).

With regard to the burden of proof required to support a rejection under Section 112, the Patent Office is required to assume that the specification complies with the enablement provision of Section 112 unless it has acceptable evidence or reasoning to suggest otherwise. See, for example, In re Marzocchi, 439 F.2d 220, 169 USPQ 367 (CCPA 1979). The Patent Office thus must provide reasons, supported by the record as a whole, why the specification is not enabling. Then and only then does the burden shift to the applicant to show that one of ordinary skill in the art could have practiced the claimed invention without undue experimentation. Gould v. Missinghoff, 229 USPQ 1 (D.D.C. 1985), aff'd in part, vacated in part, and remanded sub. nom., Gould v. Quigg, 822 F.2d 1074, 3 USPQ2d 1302 (Fed. Cir. 1987). Mere conclusionary statements as to the level of ordinary skill in the art are not a sufficient basis for a rejection under 35 U.S.C. §112. In re Brebner, 455 F.2d 1402, 173 USPQ 169 (CCPA 1972).

In addition, the law does not require, and indeed prefers, that a patent specification omit that which is well-known. In re Buchner, 929 F.2d 660, 18 USPQ2d 1331 (Fed. Cir. 1991).

The Examiner's Rejections:

The examiner rejected claims 20-24, 26-28, and 30-40 under 35 U.S.C. §112, first paragraph, for the reasons set forth in section 4 of the office action.

Summary of Argument:

The examiner's rejections are improper in that new references cited by the examiner (i.e., Derlet, Banzuch, Zhu, and Shaffer) fail to establish a lack of enablement of the rejected claims. To the contrary, the Derlet, Banzuch, Zhu, and Shaffer references indicate that persons having ordinary skill in the art

are fully aware of the numerous algorithms that are available, as well as the considerations involved in selecting an algorithm suitable for a given application. Stated another way, while the references cited by the examiner may be regarded as providing an indication that certain issues relating to the selection and implementation of such algorithms may be complex, thus may lead to complex experimentation, the mere fact that the experimentation is complex does not make it undue where, as here, the art typically engages in such experimentation. In re Wands, supra.

The examiner has also failed to conduct an analysis of the undue experimentation factors listed in MPEP 2164.01(a). Consequently, the examiner's rejections cannot overcome the presumption of enablement.

Moreover, the best measure of level of disclosure required in this particular field of endeavor can be obtained by reviewing issued U.S. patents in the same field. As will be described in greater detail below, those patents provide a similar level of disclosure to that of the pending application. Because the level of disclosure in the pending application is on a par with the level of disclosure provided by issued U.S. patents in the same field, the level of disclosure provided in the pending application is sufficient under Section 112. Consequently, the examiner's rejections are improper and must be removed.

The examiner's rejections under Section 112, first paragraph, relate to the sufficiency of disclosure of four algorithms: 1) The Doppler Broadening Algorithm; 2) the positron lifetime algorithm; 3) the selective activation algorithm; and 4) the three-dimensional imaging algorithm. More specifically, the examiner has asserted that the written description fails to describe how and in what manner these algorithms should be selected and/or modified as well as how one would evaluate the constants in the algorithms.

Applicant will address the issues related to each algorithm separately.

Doppler Broadening Algorithm:

The examiner's rejection of this algorithm is based on the assertion that the written description fails to describe how and in what manner the Doppler broadening algorithm should be selected and/or modified and how one would evaluate the constants in the algorithm. This rejection is improper in that the examiner has failed to overcome the presumption that the written description is sufficiently enabling as to this algorithm. That is, the examiner has not conducted an analysis of the undue experimentation factors listed in MPEP 2164.01(a).

The Doppler broadening algorithm 62 is described in paragraphs 0028, 0055, and 0056 of the written description. In addition, the written description states that, in one embodiment, the Doppler broadening algorithm may be that disclosed in U.S. Patent No. 6,178,218 to Akers, which is specifically incorporated by reference into the written description.

In section 2 of the office action, the examiner argues that the newly cited references (i.e., Derlet, Banzuch, Zhu, and Shaffer) support his rejections. Applicant respectfully disagrees. To the contrary, rather than supporting the examiner's enablement rejections, the references support a conclusion that the description of the algorithms is fully enabled. That is, the references confirm the statements in the written description of the present application that Doppler broadening algorithms are known in the art. The references also confirm that persons having ordinary skill in the art appreciate the issues in selecting a Doppler broadening algorithm from among the many. For example, the Banzuch reference includes a description of the various types of Doppler broadening algorithms as well as the how such algorithms may be adapted for use in specific applications.

Stated another way, the Banzuch reference confirms that the level of ordinary skill in the art is high, as is the level of knowledge regarding Doppler broadening algorithms and their suitability for various applications. While the Banzuch

reference provides an indication that certain issues relating to the selection and use of a Doppler broadening algorithm may be complex, thus may lead to complex experimentation, the mere fact that the experimentation is complex does not make it undue if the art typically engages in such experimentation. In re Wands, supra. The new references clearly demonstrate that the art is sophisticated and typically does engage in such complex experimentation.

Because, as evidenced by the new references, persons having ordinary skill in the art are well-aware of the various issues and complexities in selecting a Doppler broadening algorithm from among many algorithms, it cannot be said the failure to provide a description as to how and in what manner the Doppler broadening algorithm should be selected and/or modified and how one would evaluate the constants in the algorithm fails to meet the enablement requirement. Stated simply, such knowledge is within the level of ordinary skill in the art. Again, the fact that any experimentation may be complex does not make it undue where, as here, the art typically engages in such experimentation.

Moreover, and specific to the Doppler broadening algorithm, the written description of the present application specifically states that in one embodiment the Doppler broadening algorithm may comprise the one disclosed in U.S. Patent No. 6,178,218 to Akers. Therefore, the examiner's position that the written description fails to identify a specific Doppler broadening algorithm is erroneous.

Any doubt as to the conclusion that patent description need not include details relating to the how to select or evaluate any constants required by the Doppler broadening algorithm is erased by examining the level of disclosure provided in prior issued patents in the same field of endeavor. In the case of the Doppler broadening algorithm, U.S. Patent No. 6,178,218 to Akers describes how a Doppler broadening algorithm or technique may be used to analyze annihilation gamma rays. That issued patent provides no more detail as to how and in what manner one would

evaluate the constants in the algorithm than does the pending application. Consequently, the level of disclosure provided in the pending application is sufficient under Section 112.

Finally, the examiner is of the opinion that because the Akers patent does not use the term "algorithm," that somehow the disclosure in the present application is non-enabling. The examiner's rationale is contrary to Federal Circuit law on this issue. As argued by the applicant in a previous response, the Court of Appeals for the Federal Circuit has found that "every step-by-step process, be it electronic, chemical, or mechanical, involves an 'algorithm' in the broad sense of the term." State Street Bank & Trust Co. v. Signature Financial Group, Inc., 149 F.3d 1368, 1374-1375, 47 USPQ2d 1596, 1602 (Fed. Cir. 1998).

The "technique" described in detail in the Akers patent for Doppler broadening is also an algorithm, which fits the usage thereof in the pending claims. Accordingly, the prior description by itself and in view of the knowledge of persons having ordinary skill in the art is sufficiently enabling to support the present claims. Contrary to the position of the examiner, there is no need for any further guidance in how to select any particular technique, nor how to transform any such technique into an algorithm, nor how to evaluate any constants in any resulting mathematical formula. The present disclosure, as supplemented by the Akers patent provides all the guidance necessary.

Positron Lifetime Algorithm:

The examiner's rejections as to this algorithm are also based on the assertion that the written description fails to describe how and in what manner this algorithm should be selected and/or modified and how one would evaluate the constants in the algorithm. This rejection is also improper in that the examiner has failed to conduct an analysis of the undue experimentation factors listed in MPEP 2164.01(a). Consequently, the examiner's rejections fail to overcome the presumption that the written

description is sufficiently enabling.

The positron lifetime algorithm 64 is described in paragraphs 0028, 0055, and 0057 of the written description.

In section 2 of the office action, the examiner argues that various ones of the newly cited references (i.e., Derlet, Banzuch, Zhu, and Shaffer) support his rejections. Applicant respectfully disagrees.

As discussed above with respect to the Doppler broadening algorithm, rather than supporting the examiner's rejections, the references support a conclusion that the description of the positron lifetime algorithm is fully enabled. That is, the references confirm that the level of ordinary skill in this art is high, and that persons having such ordinary skill would be able to select a suitable positron lifetime algorithm from among the many and also would be able to select and/or evaluate any constants that may be required for the selected algorithm. While the references cited by the examiner indicate that certain issues relating to the selection and implementation of a positron lifetime algorithm may be complex, thus may lead to complex experimentation, the mere fact that the experimentation is complex does not make it undue where, as here, the art typically engages in such experimentation. See, for example, In re Wands, supra.

Because, as evidenced by the new references, persons having ordinary skill in the art are well-aware of the various issues and complexities in selecting a positron lifetime algorithm from among many algorithms, it cannot be said the failure to provide a description as to how and in what manner the positron lifetime algorithm should be selected and/or modified and how one would evaluate the constants in the algorithm fails to meet the enablement requirement. Indeed, and as evidenced by the newly cited references (i.e., Derlet, Banzuch, Zhu, and Shaffer) such knowledge is within the level of ordinary skill in the art.

In addition, any doubt as to the conclusion that patent description need not include the level of detail desired by the

examiner is erased by examining the level of disclosure provided in prior issued patents in the same field of endeavor. In the case of the positron lifetime algorithm, U.S. Patent No. 6,178,218 to Akers describes how the measurement of positron lifetime can be used to indicate the presence of defects in metals. In addition, U.S. Patent No. 4,064,438 to Alex *et al.* describes how a positron lifetime measurements may be used to detect hydrogen embrittlement. Significantly, neither issued patent provides any more detail than does the pending application as to how and in what manner a positron lifetime technique or algorithm should be selected and/or modified and how one would evaluate the constants in the algorithm. Consequently, the level of disclosure provided in the pending application is sufficient under Section 112.

Selective Activation Algorithm:

The examiner's rejections as to this algorithm are also based on the assertion that the written description fails to describe how and in what manner this algorithm should be selected and/or modified and how one would evaluate the constants in the algorithm. This rejection is improper in that the examiner again has failed to conduct an analysis of the undue experimentation factors listed in MPEP 2164.01(a). Thus, the examiner's rejections cannot overcome the presumption that the written description is sufficiently enabling as to the selective activation algorithm.

The selective activation algorithm 68 is described in paragraphs 0030 and 0060, of which paragraph 0060 is reproduced below.

> "For each analysis algorithm, e.g., 62, 64, and 66, described above the data processing system 60 may utilize a selective activation algorithm 68. The selective activation algorithm 68 allows certain isotopes or positron emitters in the specimen 18 to be activated. The selective activation algorithm 68 is responsive to input from the user regarding either the particular positron emitter or emitters to be

> activated or the desired photon energy. The selective activation algorithm 68 then controls or operates the photon source 12 as necessary to produce photons 16 having energy levels suitable for activating the selected positron emitter or emitters. The selective activation algorithm 68 allows the user to activate certain of the isotopes or positron emitters comprising the specimen 18."

Stated simply, the selective activation algorithm causes the data processing system to set the energy level of the photons produced by the photon source. This allows the user to activate certain of the isotopes or positron emitters in the specimen. It is sufficiently described to allow a person having ordinary skill in the art to practice the invention without undue experimentation. That is, the nature of the invention, the state of the prior art, and the level of one of ordinary skill in the art are such that the description provided in the specification is more than sufficient to all a person having ordinary skill in the art to practice the invention without undue experimentation.

Another defect in the examiner's rejections is that the rejections appear to assume that the selective activation algorithm is known in the art and described in the new references (i.e., Derlet, Banzuch, Zhu, and Shaffer), because the examiner never specifically addresses the selective activation algorithm. However, none of these references disclose the selective activation algorithm. The selective activation algorithm is not prior art, and it is improper for the examiner to merely lump together this algorithm with the others.

Notwithstanding the examiner's failure to separately consider the selective activation algorithm, the examiner's rejections are also improper in that he has failed to analyze the undue experimentation factors listed in MPEP 2164.01(a). Because of these failures, the examiner's rejections cannot overcome the presumption that the description of the selective activation algorithm is sufficiently enabling as a matter of law. Consequently, the examiner's rejections are improper and must be

removed.

Three-Dimensional Imaging Algorithm:

The examiner rejected this algorithm in that the written description fails to describe how and in what manner this algorithm should be selected and/or modified and how one would evaluate the constants in the algorithm. This rejection is also improper in that the examiner has failed to conduct an analysis of the undue experimentation factors listed in MPEP 2164.01(a). Thus, the examiner's rejections can't overcome the presumption that the written description is sufficiently enabling as to the three-dimensional imaging algorithm.

The 3-D imaging algorithm 66 is described in paragraphs 0028, 0055, 0058, and 0059.

As discussed above, the newly cited references are evidence that persons having ordinary skill in the art are fully aware of the numerous algorithms that are available in positron annihilation spectroscopy, and further that they are aware of the considerations involved in selecting an algorithm suitable for a given application. That is, while the references cited by the examiner indicate that certain issues regarding the selection and implementation of a three-dimensional imaging algorithm may be complex, thus may lead to complex experimentation, the mere fact that the experimentation is complex does not make it undue where, as here, the art typically engages in such experimentation. In re Wands, supra.

Because, as evidenced by the new references, persons having ordinary skill in the art are well-aware of the various issues and complexities in selecting and implementing a certain algorithm from among many algorithms, it cannot be said the failure to provide a description as to how and in what manner the 3-D imaging algorithm should be selected and/or modified and how one would evaluate the constants in the algorithm fails to meet the enablement requirement. Indeed, such knowledge is within the level of ordinary skill in the art.

Any doubt as to the conclusion that patent description need not include such detail is erased by examining the level of disclosure provided in prior issued patents in the same field of endeavor. In the case of the three-dimensional imaging algorithm, U.S. Patent No. 4,756,866 to Alvarez describes how traced annihilation gamma rays can be used to gain "a non-invasive three-dimensional scan" of the object. That issued patent provides no more detail as to how and in what manner a three-dimensional technique or algorithm should be selected and/or modified and how one would evaluate the constants in the algorithm than does the pending application. Consequently, the level of disclosure provided in the pending application is sufficient under Section 112.

Legal Standard for Rejecting Claims
Under 35 U.S.C. §112, Second Paragraph

The test for definiteness of claim language is whether a person having ordinary skill in the art would understand the bounds of the claim when read in light of the specification, and the degree of precision necessary for adequate claims depends on the nature of the subject matter. Miles Laboratories, Inc., v. Shandon, Inc., 27 USPQ2d 1123 (Fed. Cir. 1993).

The Examiner's Rejections:

The examiner rejected claims 20-24, 26-28, and 30-40 under 35 U.S.C. §112, second paragraph, for the reasons set forth in section 5 of the office action. These rejections are improper in that in that the examiner has also failed to overcome the presumption that the claims are sufficiently definite under Section 112 when filed.

In responding to these rejections, applicant hereby repeats the arguments set forth above in response to the Section 112, first paragraph, rejections. That is, the various algorithms are not only enabled when considered in light of the level of ordinary skill in the art, but are also not vague nor indefinite

for the same reason, i.e., the person having ordinary skill in the art would understand the algorithms and possess the knowledge required to evaluate the many algorithms available and select those that would be appropriate for the desired application.

In addition, with regard to the Doppler broadening algorithm, paragraph 0056 of the specification states that several different types of Doppler broadening techniques have been developed and could be used. The specification also states that the Doppler broadening algorithm may comprise the algorithm disclosed in U.S. Patent No. 6,178,218.

The positron lifetime algorithm is described in paragraph 0057 of the specification. That paragraph also makes clear that "systems for detecting positron lifetimes, as well as the algorithms utilized thereby, are well-known in the art and could be easily provided by persons having ordinary skill in the art after having become familiar with the teachings of the present invention."

With respect to three-dimensional imaging algorithms, paragraph 0059 of the specification also states that several different types of 3-D imaging algorithms are known in the art and could be used in conjunction with the present invention.

Clearly, the terms "Doppler broadening algorithm," "positron lifetime algorithm," and "three dimensional imaging algorithm" are specifically referred to in the specification, thus provide sufficient support for their use in the claims. In addition, techniques for performing both of these processes are well-known to persons having ordinary skill in the art, and could be easily provided by persons having ordinary skill in the art after having become familiar with the teachings of the present invention. For example, the publication cited by the applicant in the Information Disclosure statement, namely the paper entitled "Positron Annihilation Spectroscopy," discusses the Doppler broadening and positron lifetime techniques, as well as methods for performing these techniques. Three-dimensional imaging techniques are also well-known in the art and are commonly used

in PET medical scanners.

Therefore, because Doppler broadening, positron lifetime, and 3-D imaging techniques are well known to persons having ordinary skill in the art and could be easily provided by persons having ordinary skill in the art after having become familiar with the teachings of the present invention, the references in the specification and claims to "Doppler broadening algorithm," "positron lifetime algorithm," and "three dimensional imaging algorithm" meet the requirements set forth in Miles Laboratories, supra, that is, these terms have sufficient meaning to persons having ordinary skill in the art to allow them to understand the bounds of the claims when read in light of the specification.

With regard to the selective activation algorithm, applicant notes that the selective activation algorithm is described in paragraph 0060 and basically involves controlling or operating the photon source as necessary to produce photons having energy levels suitable for activating the selected positron emitter or emitters. As described in paragraph 0036, electron accelerators capable of producing photons having a range of energies are well-known in the art. Therefore, a person having ordinary skill in the art could develop a suitable selective activation algorithm based on his level of skill coupled with an understanding of the teachings of the present invention.

Re the Rejections of Claims 1, 2, 7, and 8:

The examiner rejected claims 1, 2, 7, and 8 under Section 102(b) as being anticipated by any one of Harding, Gilboy, or Tavora. However, these rejections are moot in light of the cancellation of claims 1, 2, 7, and 8.

Re the Rejection of Claim 3:

The examiner rejected claim 3 under Section 102(b) as being anticipated by Harding. This rejection is moot in light of the cancellation of claim 3.

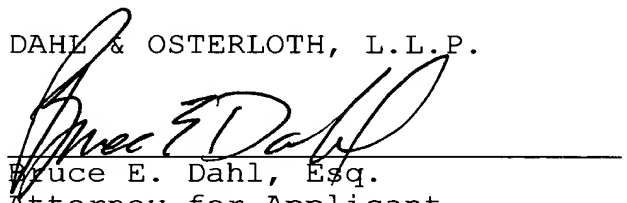
Re the Rejection of claim 5:

The examiner rejected claim 5 under Section 102(b) as being anticipated by Tavora. This rejection is moot in light of the cancellation of claim 5.

Applicant believes that all of the claims pending in this patent application are allowable and that all other issues raised by the examiner have been rectified. Therefore, applicant respectfully requests the examiner to reconsider his rejections and to grant an early allowance. If any questions or issues remain to be resolved, the examiner is requested to contact the applicant's attorney at the telephone number listed below.

Respectfully submitted,

DAHL & OSTERLOTH, L.L.P.



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